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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/741,634	12/19/2000	John G. Sikonia	595.03-US1	5633

7590

10/23/2003

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EXAMINER

CHANG, VICTOR S

ART UNIT

PAPER NUMBER

1771

DATE MAILED: 10/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/741,634	SIKONIA, JOHN G.	
	Examiner	Art Unit	
	Victor S Chang	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 8, 10-15, 17 and 34-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 10-15, 17 and 34-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The Examiner has carefully considered Applicant's Information Disclosure Statement filed on 2/24/2003, and amendments and remarks filed on 4/29/2003. Applicant's amendments to Specification and claims 1, 8 and 34; cancellation of claims 6-7, 9 and 18-33; newly added claims 35-43; and proposed drawing corrections have all been entered.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Rejections not maintained are withdrawn. Applicant's arguments with respect to claims 1-5, 8, 10-15, 17 and 34 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

4. This application, filed under former 37 CFR 1.60, lacks formal drawings. The informal drawings filed in this application are acceptable for examination purposes. When the application is allowed, applicant will be required to submit new formal drawings.

Specification

5. The disclosure is objected to because of the following informalities:

Applicant's proposed amendment to the Specification to expressly indicate that "Volatile components 126 and 146 are not shown in Figures" appears sufficient. However, the proposed amendment lacks a statement as to which page and paragraph is being amended.

Appropriate correction is required.

Response to Amendment

6. Claims 1-5, 8, 10-15, 17 and 34-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In newly amended claim 1, line 2, the recitation "a first layer on the surface of a substrate" and "a first additional layer" are clearly vague, indefinite, and in excess of the disclosure, i.e., it is not clear as to the scope of material forming these layers. The Examiner would like to suggest incorporating claims 4, 5, 8 and 12 into claim 1, so as to clarify the structure and composition of claim 1. Similarly, claim 42 is vague and indefinite regarding the scope of the "second additional layer".

Also, it is noted that claim 1, line 6, now recites in part "the structural strength of the layered material increases by at least 100%". While Applicant has pointed out a support in Examples (Remarks, page 6, second paragraph), the Examiner notes that the phrase "structural strength" is still deemed to be clearly vague and indefinite, i.e., it is not clear what is the scope of "structural strength". For the purpose of this Office action, it is presumed to be "stud pull strength".

7. Claims 1-5, 8, 10-15, 17 and 34-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US 5858869) in view of O'Neill et al. (US 6187248).

Chen's invention is directed to multilevel electrical interconnections having a planar intermetal dielectric (IMD) with low dielectric constant (Abstract). In Fig. 6, Chen shows a low dielectric insulator 20, composed of an organic material, such as a polymer, is deposited over an anisotropic plasma oxide layer 18 (column 6, lines 11-13), with metal lines 16 between the substrate and the low dielectric insulator 20. The conductive metal lines are made of Al or Cu (column 5, lines 43-44). Finally, Chen teaches that it is known art to minimize the dielectric constant of IMD, so as to improve its performance (column 1, lines 8-58).

For claims 1-5, 8, 10-15, 17, 35-39, 42 and 43, it is noted that while various layers are recited, the scope of the "first layer", "second layer", "first additional layer" and "second additional layer" are all encompassed by "nanoporous material". As such, when the nanoporous material is formed from polyarylene ether, virtually all the layers become a single layer of nanoporous polyarylene layer. While Chen lacks an express teaching that the low dielectric insulator 20 is nanoporous polyarylene, it is noted that O'Neill teaches that it is well known in the art of integrated circuits that incorporation of porosity into polymeric materials reduces its dielectric constant (column 1, lines 41-42). O'Neill also teaches that nanoporous polyarylene ether films have dielectric constant values of less than 2.0 (column 5, lines 61-64), and the average pore size is less than 30 nm (column 9, lines 9-11). As such, it would have been obvious to one of ordinary skill in the art of integrated circuits to incorporate O'Neill's nanoporous polyarylene into

Chen's multilevel electrical interconnections, motivated by the desire to improve the performance of the integrated circuits. Regarding the stud pull strength of the nonaporous polyarylene layer, it is noted that the O'Neill's method of forming the nanoporous polyarylene is essentially the same as the instantly claimed invention, as such it is believed that suitable stud pull strength is either inherently disclosed by O'Neill, or an obvious optimization to one skill in the art, motivated by the desire to for a porous material with suitable mechanical strength, as suggested by O'Neill (column 12, lines 5-10).

For claims 34, 40 and 41, while Chen and O'Neill lack an express teaching to use nanoporous admantane-based compound, it is believed that alternative equivalent low dielectric nanoporous material, such as nanoporous admantane-based compound, is well known in the art of integrated circuits, as evidenced by the state o the art Lau, which is directed to the use a nanoporous admantane-based compound as insulator material for integrated circuits (column 1, line 50 to column 2, line 62). As such, it would have been obvious to one of ordinary skill in the art to incorporate Lau's nanoporous admantane-based compound into Chen's multilevel electrical interconnections. Regarding to the use of nanoporous polyarylene and admantane-based compound alternatively in various layers, the Examiner notes that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination. See MPEP § 2144.07.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor S Chang whose telephone number is 703-605-4296. The examiner can normally be reached on 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel H Morris can be reached on 703-308-2414. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

VSC

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DANIEL ZIRKER
PRIMARY EXAMINER
GROUP ~~1800~~

1700

Daniel Zinker